In the Specification

Please amend the specification, as follows:

Page 1, lines 6 through 13:

The present invention relates to a toner supply container removably mountable in an image forming apparatus, for example, a copying machine, a printer, ~~fascimileing~~ facsimile machine, etc., which employs the electrophotographic, electrostatic, or the like recording method. It also relates to an image forming apparatus compatible with such a toner supply container.

Page 1, line 15:

[BACKGROUND ~~ART~~ OF THE INVENTION]

Page 4, lines 7 through 9:

The structural arrangement disclosed in Japanese Laid-open Patent Application 11-038755, however, suffers from the following technical problems.

Page 4, line 23, through page 5, line 9:

Thus, the employment of the ~~above described~~ above-described method for detecting the amount of the toner remainder was problematic in that it increased the cost of the image forming apparatus, and also, that it made the image forming apparatus complicated in structure. Further, in the case of the ~~above described~~ above-described method, a user was not informed of toner depletion until the replenishment toner container was completely depleted of the toner therein.

Therefore, for a user who happened to have no replenishment toner container at hand, nothing was more inconvenient than being informed of the fact that the replenishment toner container in the image forming apparatus was completely depleted of the toner.

Page 5, line 11:

[~~DISCLOSURE~~ BRIEF SUMMARY OF THE INVENTION]

Page 6, lines 18 through 23:

Figure 3, at the right side, is a schematic perspective cutaway view of the toner bottle to be mounted in the image forming apparatus according to the present invention, and at the left side, is a schematic sectional view of the toner outlet portion and cap of the toner bottle, showing the relationship thereof.

Page 11, line 12:

[~~BEST MODE FOR CARRYING TO~~ DETAILED DESCRIPTION OF THE INVENTION]

Page 17, lines 23 through 27:

All that is necessary to be performed by a user to set the toner bottle in the toner bottle tray 24 is the ~~above described~~ above-described operation. Further, the operation for replacing the toner bottle 24 is similar to the ~~above described~~ above-described operation.

Page 23, lines 17 through 24:

With the toner bottle 24 being in the ~~above described~~ above-described state, the cap coupling member 33, which also functions as the driving force transmitting means, is rotated, rotating thereby the toner bottle 24. As the toner bottle 24 is rotated, the toner in the toner bottle 24 is discharged through the toner outlet 24a by the combination of the baffle 30 and tilted plates 31 in the toner bottle 24.

Page 24, lines 4 through 19:

To describe in more detail the manner in which the cap 29 is attached to the toner bottle 24 to ensure the driving force is transmitted from the cap 29 to the toner bottle 24, as described before, the drive shaft 47 is given the rectangular (inclusive of square) cross section, and the cap 29 is given the connective hole 29a, the cross section of which matches that of the drive shaft 47 in cross section, and the axial line of which coincides with that of the drive shaft 40. Further, the drive shaft 47 is fitted in the center hole 29a so that the cap 29 is allowed to freely slide on the drive shaft 47 in the direction parallel to the axial line of the cap 29 (axial line of drive shaft 47). However, the manner in which the cap 29 is attached to the toner bottle 24 does not need to be limited to the ~~above described~~ above-described one.

Page 24, line 27, through page 25, line 4:

In Step 2, the toner bottle 24 is moved in the direction indicated by an arrow mark. In the drawing, the leading end of the cap 29, in terms of the direction in which the toner bottle 24 is moved, has just begun to ~~entering~~ enter the recess of the cap coupling member 33.

Page 25, lines 9 through 17:

In Step 4, the toner bottle 24 is moved back to its initial position. The drawing shows that the toner bottle 24 is being returned in the direction indicated by an arrow mark, that is, the direction to be moved away from the cap coupling member 33, with the cap 29 remaining coupled with the cap coupling member 33, causing thereby the toner outlet 24a, which previously remained sealed, ~~having just been~~ to become unsealed, making it thereby possible for the toner to be discharged.

Page 27, line 19, through page 28, line 2:

In Step 8, the locking projections 44 of the cap 29 are unhooked from the hooking portion 46a of the cap coupling member 33. The drawing shows that with the insertion of the ~~abovementioned~~ above-mentioned joint into the cylindrical hole 35a to a predetermined point therein having just been completed, the cap releasing projections 45 of the cap 29 have just been moved toward the axial line of the cylindrical hole 35a, by the internal surface of the hole 35a, unhooking thereby the locking projections 44 of the cap 29 from the hooking portion 46a of the cap coupling member 33.

Page 28, line 24, through page 29, line 4:

Incidentally, the ~~above described~~ above-described mechanism for conveying the toner in the toner bottle, mechanism for receiving the rotational driving force, and mechanism for pressing the cap 29 into the toner outlet 24a or partially extracting the cap 29 from the toner outlet 24a, are only examples of such mechanisms. Obviously, any of the various known mechanisms other than the above described ones may be employed.

Page 32, lines 4 through 13:

In this embodiment, thin pressure sensors (thin switch) capable of detecting micro pressure are used as toner sensors. However, the sensors used for toner remainder detection do not need to be limited to those used in this embodiment. In other words, it should be noted here that any of the various known methods may be employed as the method for detecting the amount of the toner remainder in the toner bottle 24, as long as it is capable of accurately detecting the amount of the toner remainder.

Page 32, line 20, through page 33, line 8:

The toner bottle 24 is provided with: the ~~abovementioned~~ above-mentioned thin pressure sensor 100 (which hereinafter will be referred to simply as toner sensor) as a detecting means for detecting the amount of the toner remaining in the toner bottle 24; a transmitting portion 101 as a transmitting means for transmitting in the form of wireless signals the information about the amount of the toner remainder detected by the toner sensor 100; a slip ring 105 as an energy receiving portion (electrical contact), which is enabled to slide on a power supply terminal 104, with which the image forming apparatus 1 is provided to supply the toner sensor 100 and transmitting portion 101 with driving energy (electric power). The power supply terminal 104 will be described later in more detail.

Page 33, lines 25 through 27:

The toner sensor 100 and transmitting portion 101 are integrally formed on a common substrate with the use of the ~~abovementioned~~ above-mentioned MEMS technology.

Page 35, line 23, through page 36, line 11:

In this embodiment, the image forming apparatus 1 is provided with a mechanism for mechanically detecting the presence or absence of the toner bottle 24 in the bottle tray 27. However, the image forming apparatus 1 may be structured so that the presence or absence of the toner bottle 24 is determined with the use of the toner sensor 100. That is, the signals from the toner sensor 100 may be used as the signal for determining whether or not the toner bottle 24 is in the image forming apparatus [[1,]] <u>1.</u> More concretely, as the receiving portion 103 of the main assembly of the image forming apparatus 1 receives, from the toner sensor 100, a signal which the toner sensor 100 outputs as it detects the presence of toner in the toner bottle 24, the CPU determines that there is a toner bottle in the bottle tray 27.

Page 36, line 15, through page 37, line 4:

Next, the flowchart in Figure 10, which shows the combination of the operation for detecting the amount of the toner remainder, and operation for replenishing the developing device with toner, will be described in conjunction with the concept of how the amount of the toner remainder in the toner bottle 24 <u>is determined</u>, which is shown in FIGS. 11(a)-11(f). In the following, this embodiment will be described with reference to the so-called block replenishment method, that is, a method of supplying the developing device with toner, by the amount equal to n-times (n=1, 2 . . . (integer)) the predetermined unit amount (minimum amount equivalent to replenishment step count γn, which will be described later), in order to ensure that-the developing device is replenished with a precise-amount of toner per toner replenishment operation.

Page 39, lines 19 through 26:

Thereafter, the toner bottle 24 is rotated until the drive step count γ reaches the replenishment step count γn, while the process of replenishing the developing device with toner, the process of detecting the amount of the toner remainder in the toner bottle 24, and the process of computing the replenishment step count γn, are repeatedly carried out. (Step 7).

Page 40, lines 5 through 15:

Figure 12 is a diagram which roughly shows the signal outputted for supplying the toner sensor 100 with power, the signal outputted by the toner sensor 100 as the presence of the toner is detected by the toner sensor 100, and the control signal (in the form of pulse) outputted for driving the bottle driving motor in steps, during the operation depicted by FIGS. 11(a)-11(e). It shows the detection of the presence and absence (ON and OFF of sensor) of the toner by the toner sensor 100, which occurs while the toner bottle 24 is in the conditions shown in FIGS. 11(a)-11(e).

Page 41, lines 5 through 14:

When [[C0]] $\underline{C_0}$ stands for the step count per full rotation of the toner bottle 24 by the toner bottle driving motor 106; c: the step count of the bottle driving motor while the toner sensor 100 is outputting the signals that indicate the presence of the toner per full rotation of the toner bottle 24; r: internal diameter of toner bottle 24, the ~~cross sectional~~ cross-sectional area S, shown in Figure 11, of the body of the toner remainder in the toner bottle 24 is expressed by the following approximation.

Page 41, lines 17 through 25:

Incidentally, the amount of the toner remainder can be determined from the step count c of the toner bottle driving motor during the period in which toner sensor 100 is outputting the signals that indicate the absence of the toner per full rotation of the toner bottle 24. In this case, the ~~cross sectional~~ cross-sectional area S' of the body of the toner remainder in the toner bottle 24 can be expressed by the following approximation.

Page 42, lines 18 through 25:

Further, during the initial stage of the toner replenishment operation with the use of a brand-new toner bottle 24, this correction factor .alpha. is a variable that is dependent on the length of time the toner is stirred. However, as the body of toner in the toner bottle 24 is sufficiently stirred, the correction factor a becomes constant (variable) proportional to the ~~cross sectional~~ cross-sectional area S.

Page 43, lines 1 through 4:

As described above, the amount of the toner remainder can be precisely detected with the employment of the ~~above described~~ above-described structural arrangement and controlling method.

Page 48, line 13, through page 50, line 14:

In the case of the ~~above described~~ above-described structural arrangement which utilizes the oscillatory rotation of the toner bottle 24, the amount of the toner remainder in the toner

bottle 24 is determined based on the cumulative value of the step count c in the period in which the signals indicating the presence of toner are outputted during the period between when the internal state of the toner bottle 24 is as shown in FIG. 16(a) and when the internal state of the toner bottle 24 is as shown in FIG. 16(h). This method also can successively determine the amount of the toner remainder in the toner bottle 24 just as precisely as the ~~above described~~ above-described method.

With the employment of the ~~above described~~ above-described structural arrangement, it is possible to prevent an image forming apparatus from becoming complicated in structure, and increasing in cost.

Also with the employment of the ~~above described~~ above-described structural arrangement, the amount of the toner remainder in the toner bottle 24 can be precisely and successively determined. Therefore, it becomes possible to inform a user of the need for replenish toner bottle replacement, at an opportune time. In addition, it enables a user to schedule the times for ordering or replacing the toner bottle 24, according to the [[user s]] user's own convenience. Therefore, it is possible to minimize the space necessary for storing the replacement toner bottles, and substantially reduce the downtime (period of time when image forming operation cannot be performed) of an image forming apparatus attributable to the problem that the toner bottle 24 runs out of the toner. In other words, the employment of the ~~above described~~ above-described structural arrangement can drastically improve an image forming apparatus in usability.

Also with the employment of the ~~above described~~ above-described structural arrangement, it becomes possible to stabilize the amount by which the toner is discharged from the toner bottle 24 to replenish the developing device with the toner. Therefore, it is possible to

simplify in function, or eliminate, the hopper portion which is for temporarily storing the toner discharged from the toner bottle 24 to ensure that the developing device is continuously replenished with a stable amount of toner.

Further, the function of the hopper portion, as a temporary toner storage portion, disposed between the toner bottle 24 and developing device to ensure that a substantial number of copies can be made even after it is detected that the toner bottle 24 has completely run out of toner, becomes unnecessary. In other words, the hopper portion itself becomes unnecessary. Thus, the ~~above described~~ above-described structural arrangement makes it possible to further simplify, and reduce in size, the main assembly of an image forming apparatus.

Page 53, line 19, through page 54, line 12:

As the toner is detected by the sets 102a -102c of toner sensors as shown in FIG. 20, the replenishment count γn is computed by the CPU based on the number of the toner sensors (ca-cc) of the toner sensor sets 102a -102c, which detected the toner. Then, the old replenishment step count γn is replaced with the newly computed value (Step 5). The toner bottle 24 is continuously rotated in the arrow mark direction in FIG. 20 until the step count γ of the bottle driving motor 106 reaches the newly computed replenishment step count γn, while the process of replenishing the developing device with toner, the process of detecting the amount of the toner remainder in the toner bottle 24, and the process of computing the proper replenishment step count γn, are repeated (Step 4). The driving of the bottle driving motor 106 is stopped as soon as the value in the counter for counting the number of steps the bottle driving member 106 has been driven reaches the replenishment step count γn (motor activation count γ =replenishment step count γn) (Step 6).

Page 55, lines 10 through 18:

The ~~cross sectional~~ cross-sectional area S of the body of the toner remainder in the toner bottle 24 shown in FIG. 20 can be expressed in the following approximation, wherein [[C0]] C_0 stands for the total number of toner detecting portions (toner sensors); [[ca-cc]] C_a-C_c stand for the numbers of toner sensors of each toner sensor sets 102a -102c which are detecting the presence of the toner; and r stands for the internal diameter of the bottle proper 28 of the toner bottle 24.

Page 55, lines 21 through 25:

Further, the volume V of the toner remainder in the toner bottle 24 can be expressed by the following approximation, by detecting the presence or absence of the toner in the toner bottle 24 with the use of the ~~above described~~ above-described structural arrangement.

Page 57, lines 2 through 7:

With the employment of the ~~above described~~ above-described structural arrangement and control, it is possible to stabilize the amount by which the toner is discharged for the replenishment of the developing device with the toner, regardless of the amount of the toner remainder in the toner bottle 24.

Page 63, lines 16 through 24:

Referring to Figure 24(b), at roughly the same time as the optical prism 109 and light sensor 110 become coincidental in rotational phase, the coupling tooth 113 of the toner bottle 24

engages with the driving force transmitting tooth 114, causing the rotational bottle socket 108 to rotate in the direction indicated by an arrow mark A' (bottle ~~socked~~ socket 108 is rotated by rotation of toner bottle 24) (Step 3).

Page 65, lines 13 through 24:

The toner bottle 24 is further rotated in the arrow mark A direction until the value in the time t for counting the length of time the bottle motor 107 is rotated reaches the new value γn for the length of the replenishment time τ, while the process of replenishing the developing device with the toner from the toner bottle 24, the process of detecting the amount of the toner remainder in the toner bottle 24, and the process of computing the length of time for toner replenishment, are repeated (Step 4). Then, as the value in timer t reaches the value γn, the bottle motor 107 is stopped (Step 5).

Page 66, lines 13 through 16:

When the internal diameter of the toner bottle 24 is r, the ~~cross sectional~~ cross-sectional area S of the body of the toner in the toner bottle 24 shown in FIG. 14 can be expressed by the following approximation.

Page 66, line 19, through page 67, line 3:

When the length of the toner bottle 24 is L, and the correction factor dependent on the cross sectional area S of the body of the toner, perpendicular to the lengthwise direction of the toner bottle 24, is a(S), the volume V of the toner remaining in the toner bottle 24 can be expressed by the following approximation, as accurately as in the first embodiment, by detecting

the presence (absence) of the toner with the employment of the ~~above described~~ above-described structural arrangement and controlling method.

Page 68, lines 2 through 7:

With the employment of the ~~above described~~ above-described structural arrangement and control, it is possible to stabilize the amount by which the toner is discharged for the replenishment of the developing device with the toner, regardless of the amount of the toner remainder in the toner bottle 24.

Page 72, line 6, through page 73, line 11:

With the employment of the ~~above described~~ above-described structural arrangement, it is assured that the amount of the toner remainder in the toner bottle 24 is accurately and continually detected. Therefore, not only is it possible to inform a user of the need of toner bottle replacement, at a more opportune time, but also, to enable a user to schedule the times for ordering or replacing the toner bottle 24, according to the user's own convenience. Therefore, it is possible to substantially reduce the space necessary for storing the replacement toner bottles, and the downtime of an image forming apparatus. In other words, the employment of the ~~above described~~ above-described structural arrangement can drastically improve an image forming apparatus in usability.

Also with the employment of the ~~above described~~ above-described structural arrangement, it becomes possible to stabilize the amount by which the developing device is replenished with the toner from the toner bottle 24. Therefore, it is possible to simplify in function, or eliminate, the hopper portion which is for temporarily storing the toner discharged

from the toner bottle 24 to ensure that the developing device is continuously replenished with a stable amount of toner. Further, the function of the hopper portion, as a temporary toner storage portion for ensuring that a substantial number of copies can be made even after the detection of the complete depletion of the toner in the toner bottle 24, becomes unnecessary. In other words, the hopper portion itself becomes unnecessary. Thus, the ~~above described~~ above-described structural arrangement makes it possible to further simplify, and reduce in size, the main assembly of an image forming apparatus.

Page 73, lines 17 through 21:

As described above, according to the ~~above described~~ above-described first to third embodiments of the present invention, it is possible to prevent an image forming apparatus from increasing in cost, and also, from becoming complicated in structure.